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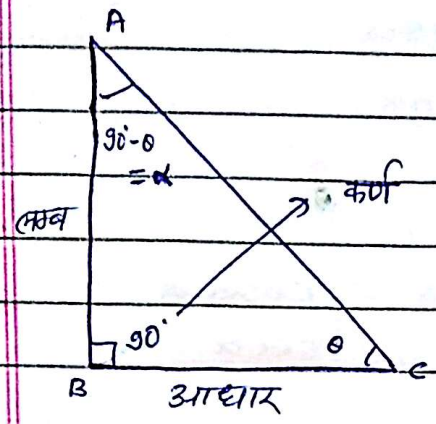
त्रिकोणमिति (TRIGONOMETRY)



$\sin\theta = \frac{\text{लम्ब}}{\text{कर्ण}}$ $\cos\theta = \frac{\text{आधार}}{\text{कर्ण}}$ $\tan\theta = \frac{\text{लम्ब}}{\text{आधार}}$

$\text{cosec}\theta = \frac{\text{कर्ण}}{\text{लम्ब}}$, $\sec\theta = \frac{\text{कर्ण}}{\text{आधार}}$ $\cot\theta = \frac{\text{आधार}}{\text{लम्ब}}$

$\sin\theta \times \text{cosec}\theta = 1 \Rightarrow \sin\theta = \frac{1}{\text{cosec}\theta}$ or $\text{cosec}\theta = \frac{1}{\sin\theta}$

$\cos\theta \times \sec\theta = 1 \Rightarrow \cos\theta = \frac{1}{\sec\theta}$ or $\sec\theta = \frac{1}{\cos\theta}$

$\tan\theta \times \cot\theta = 1 \Rightarrow \tan\theta = \frac{1}{\cot\theta}$ or $\cot\theta = \frac{1}{\tan\theta}$

$\sin\theta = \frac{AB}{AC}$ $\sin\alpha = \frac{BC}{AC}$

$\cos\theta = \frac{BC}{AC}$ $\cos\alpha = \frac{AB}{AC}$

$\tan\theta = \frac{AB}{BC}$ $\tan\alpha = \frac{BC}{AC}$

$\cot\theta = \frac{BC}{AC}$ $\cot\alpha = \frac{AB}{BC}$

$\sec\theta = \frac{AC}{BC}$ $\sec\alpha = \frac{AC}{AB}$

$\text{cosec}\theta = \frac{AC}{AB}$ $\text{cosec}\alpha = \frac{AC}{BC}$

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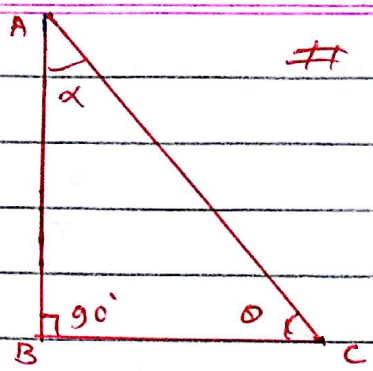

यदि $\theta + \alpha = 90^\circ$ होतो θ व α पूरक कोण होंगे।

तब

$\sin\theta = \cos\alpha$,

$\cos\theta = \sin\alpha$,

$\tan\theta = \cot\alpha$ $\quad$ $\sec\theta = \operatorname{cosec}\alpha$

$\cot\theta = \tan\alpha$ $\quad$ $\operatorname{cosec}\theta = \sec\alpha$

$\sin\theta = \cos(90^\circ - \theta)$ $\quad$ $\tan\theta = \cot(90^\circ - \theta)$

$\cos\theta = \sin(90^\circ - \theta)$ $\quad$ $\cot\theta = \tan(90^\circ - \theta)$

$\sec\theta = \operatorname{cosec}(90^\circ - \theta)$

$\operatorname{cosec}\theta = \sec(90^\circ - \theta)$

$\tan\theta \cdot \cot\theta = 1$ then $\tan\theta \cdot \tan(90^\circ - \theta) = 1$

or $\cot\theta \cot(90^\circ - \theta) = 1$

Q:> $\tan 1 \cdot \tan 2 \cdot \tan 3 \text{ - - - - } \tan 89 = ?$

Soln. $\tan 1 \cdot \tan 2 \cdot \text{ - - - - } \tan(90^\circ - 2^\circ)\tan(90^\circ - 1)$

$= 1$ ans.

Q:- $\tan 28^\circ \cdot \tan 29^\circ \cdot \tan 30^\circ \cdot \tan 61^\circ \cdot \tan 62^\circ = ?$

Soln:- $\tan 28^\circ \cdot \tan 29^\circ \cdot \tan 30^\circ \cdot \tan 61^\circ \cdot \tan 62^\circ$

$= \tan 30^\circ = \dfrac{1}{\sqrt{3}}$ ans.

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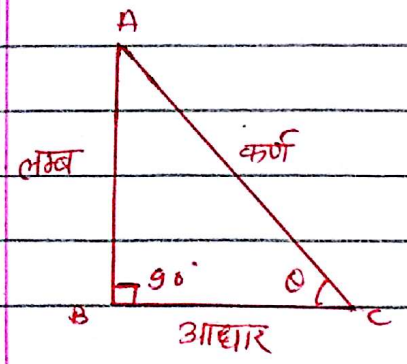

$\sin\theta = \frac{\text{लम्ब}}{\text{कर्ण}}$ ⇒ लम्ब = 0° → $\theta = 0°$

↳ $\sin\theta = 0, \cos\theta = 1$

$\cos\theta = \frac{\text{आधार}}{\text{कर्ण}}$ → आधार = 0 → $\theta = 90°$

↳ $\cos 90° = 0$

$\sin 90° = 1$

$0° < \theta < 90°$ होने पर $\sin\theta, \cos\theta$ → उचित भिन्न / Proper frac^n

or $1 > \sin\theta > 0$

$1 > \cos\theta > 0$

$0 \leq \theta \leq 90°$ होने पर ⇒

$1 \geq \sin\theta \geq 0$

$1 \geq \cos\theta \geq 0$

	0	30°	45°	60°	90°
$\sin\theta$	0	$1/2$	$1/\sqrt{2}$	$\sqrt{3}/2$	1
$\cos\theta$	1	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	0
$\tan\theta$	0	$\frac{1}{\sqrt{3}}$	1	$\sqrt{3}$	∞
$\cot\theta$	∞	$\sqrt{3}$	1	$\frac{1}{\sqrt{3}}$	0
$\sec\theta$	1	$\frac{2}{\sqrt{3}}$	$\sqrt{2}$	2	∞
$\operatorname{cosec}\theta$	∞	2	$\sqrt{2}$	$\frac{2}{\sqrt{3}}$	1

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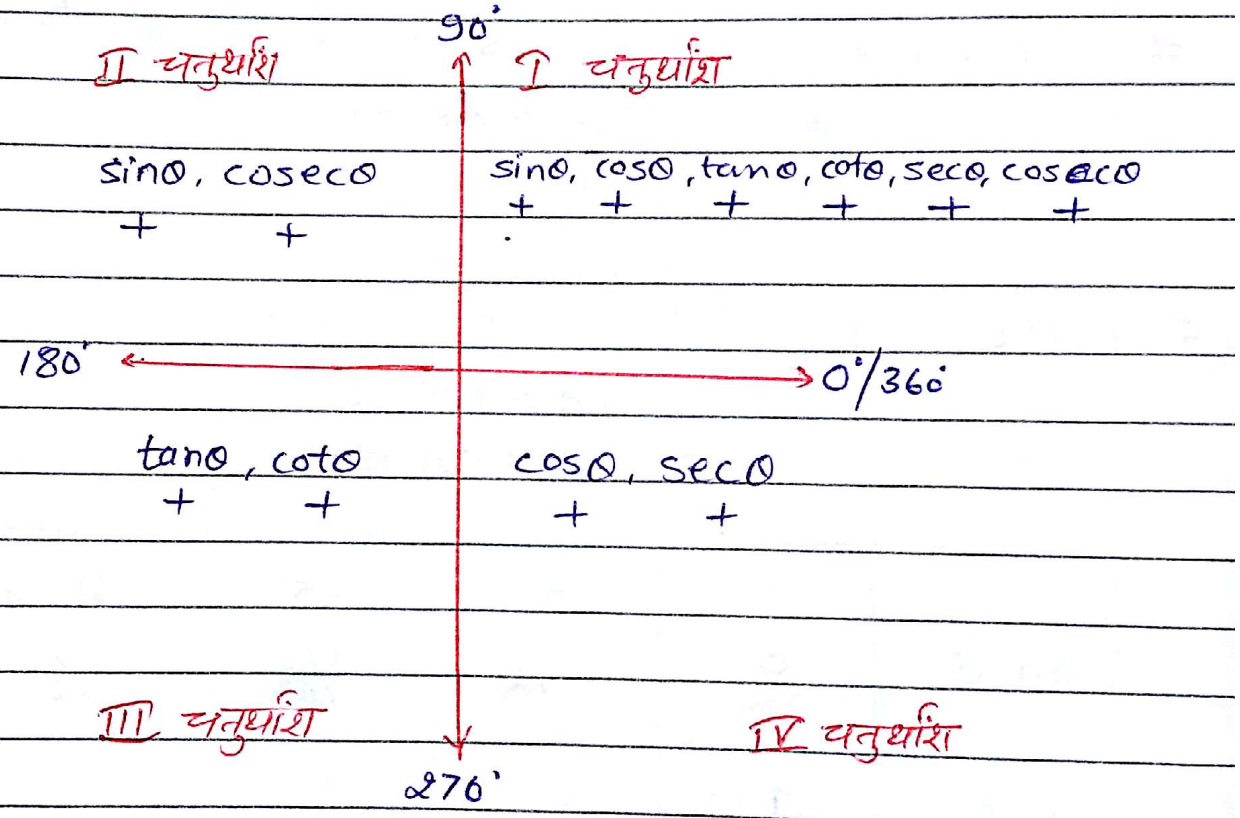
$90^\circ \geq \theta \geq 0^\circ$ में θ° बढ़ने के साथ →

$\sin\theta$ ⟶ बढ़ता है।
$\cos\theta$ ⟶ घटता है।
$\tan\theta$ ⟶ बढ़ता है।
$\cot\theta$ ⟶ घटता है।
$\sec\theta$ ⟶ बढ़ता है।
$\operatorname{cosec}\theta$ ⟶ घटता है।



##

जब $x > 0$ तब $\left(x + \frac{1}{x}\right) \geq 2$

$\therefore (\sin\theta + \operatorname{cosec}\theta) \geq 2 \rightarrow$ I/II में

$(\cos\theta + \sec\theta) \geq 2 \rightarrow$ I/IV में

$(\tan\theta + \cot\theta) \geq 2 \rightarrow$ I/III में

जब $x < 0$ तब $\left(x + \frac{1}{x}\right) \leq -2$

$\therefore (\sin\theta + \operatorname{cosec}\theta) \leq -2 \rightarrow$ III/IV में

$(\cos\theta + \sec\theta) \leq -2 \rightarrow$ II/III में

$(\tan\theta + \cot\theta) \leq -2 \rightarrow$ II/IV में

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∵ we know that $x^2 + \frac{1}{x^2} \geq 2$ then.

$\sin^2\theta + \operatorname{cosec}^2\theta \geq 2$

$\cos^2\theta + \sec^2\theta \geq 2$

$\tan^2\theta + \cot^2\theta \geq 2$

जब $\theta^\circ > 90^\circ$ हो तब value ज्ञात करना →

$\frac{\theta}{90^\circ}$ → भागफल → सम → No change

→ विषम → $\sin\theta \to \cos\theta$

$\cos\theta \to \sin\theta$

$\tan\theta \to \cot\theta$

$\cot\theta \to \tan\theta$

$\sec\theta \to \operatorname{cosec}\theta$

$\operatorname{cosec}\theta \to \sec\theta$

शेषफल → New θ°

Ex: $\sin 120^\circ$ → $\cos 30^\circ$ → $\frac{\sqrt{3}}{2}$

$\cos 120^\circ$ → $\sin 30^\circ$ → $-\frac{1}{2}$

II quadrant में cosθ -ve होता है।

$\tan 120^\circ$ → $\cot 30^\circ$ → $-\sqrt{3}$

II nd quadrant में tanθ -ve होता है।

Ex: $\sin 300^\circ$ → $\cos 30^\circ$ → $\frac{-\sqrt{3}}{2}$

$\cos 300^\circ$ → $\sin 30^\circ$ → $\frac{1}{2}$

$\tan 300^\circ$ → $\cot 30^\circ$ → $-\sqrt{3}$

→ -sign for quadrant position of sinθ & tanθ in IV quadrant.

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$-\theta = 360^\circ - \theta^\circ$

$\sin(-\theta) = -\sin\theta$ $\quad$ $\operatorname{cosec}(-\theta) = -\operatorname{cosec}\theta$

$\cos(-\theta) = \cos\theta$ $\quad$ $\sec(-\theta) = \sec\theta$

$\tan(-\theta) = -\tan\theta$ $\quad$ $\cot(-\theta) = -\cot\theta$

सर्वसमिकायें :-

सर्वसमिका - 1 $\boxed{\sin^2\theta + \cos^2\theta = 1}$

or $\sin\theta = \sqrt{1-\cos^2\theta}$ or $\cos\theta = \sqrt{1-\sin^2\theta}$

$\sin^2\theta + \sin^2(90^\circ - \theta) = 1$ & $\cos^2\theta + \cos^2(90^\circ - \theta) = 1$

Q>:- $\sin^2 1^\circ + \sin^2 3^\circ + \sin^2 5^\circ + \cdots + \sin^2 85^\circ + \sin^2 87^\circ + \sin^2 89^\circ = ?$

Soln → $1 + 1 + \cdots$ (22 बार) $+ \frac{1}{2} = \frac{45}{2}$ or 22.5 ans

$(\sin\theta + \cos\theta)^2 = 1 + 2\sin\theta\cos\theta$

or

$(\sin\theta - \cos\theta)^2 = 1 - 2\sin\theta\cos\theta$

⊕

$\boxed{(\sin\theta + \cos\theta)^2 + (\sin\theta - \cos\theta)^2 = 2}$

$a^4 + b^4 = (a^2+b^2)^2 - 2a^2b^2$ से

$(\sin^4\theta + \cos^4\theta) = 1 - 2\sin^2\theta\cos^2\theta$

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we know that $a^3+b^3 = (a+b)^3 - 3ab(a+b)$

& $a^6+b^6 = (a^2+b^2)^3 - 3a^2b^2(a^2+b^2)$

then

$$\sin^6\theta + \cos^6\theta = 1 - 3\sin^2\theta\cos^2\theta.$$

$\sin^4\theta - \cos^4\theta = (\sin^2\theta+\cos^2\theta)(\sin^2\theta-\cos^2\theta)$

$= (\sin^2\theta - \cos^2\theta)$ ——— (1)

$= (2\sin^2\theta - 1)$ ——— (2)

$= (1 - 2\cos^2\theta)$ ——— (3)

$= -\cos 2\theta$ ——— (4)

from (1) →

$$\sin^4\theta - \cos^4\theta = \frac{\tan^2\theta - 1}{\sec^2\theta} \Rightarrow \frac{\tan^2\theta - 1}{1+\tan^2\theta}$$ ——— (5)

~~इसी प्रकार~~ →

$\cos^4\theta - \sin^4\theta = (\cos^2\theta+\sin^2\theta)(\cos^2\theta-\sin^2\theta)$

$= \cos^2\theta - \sin^2\theta$ ——— (1)

$= 2\cos^2\theta - 1$ ——— (2)

$= 1 - 2\sin^2\theta$ ——— (3)

$= \cos 2\theta$ ——— (4)

$$= \frac{1 - \tan^2\theta}{1 + \tan^2\theta}$$ ——— (5)

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जब $a\sin\theta + b\cos\theta = x$ ① व $b\sin\theta - a\cos\theta = y$ ② हो तब

after squaring both side & adding ① & ② we get →

$$a^2\sin^2\theta + b^2\cos^2\theta + 2ab\sin\theta\cos\theta + b^2\sin^2\theta + a^2\cos^2\theta - 2ab\sin\theta\cos\theta = x^2 + y^2$$

$$\Rightarrow a^2(\sin^2\theta + \cos^2\theta) + b^2(\sin^2\theta + \cos^2\theta) = x^2 + y^2$$

$$\Rightarrow 1 \qquad \Rightarrow 1$$

$$\boxed{a^2 + b^2 = x^2 + y^2}$$

Q) :→ $3\sin\theta + 4\cos\theta = 5$ हो तो

$4\sin\theta - 3\cos\theta = (y)$? ज्ञात करो

Sol^n → $a^2 + b^2 = x^2 + y^2$ से $3^2 + 4^2 = 5^2 + y^2$

$$5^2 = 5^2 + y^2$$

$$\boxed{y = 0}$$ ans.

$a\sin\theta + b\cos\theta = c$ हो तो $\sin\theta, \cos\theta, \tan\theta$ ज्ञात करना

$$\frac{a}{c}\sin\theta + \frac{b}{c}\cos\theta = 1$$

$\sin(\theta + \alpha) = \cos\alpha\sin\theta + \sin\alpha\cos\theta$ से तुलना करने पर

यहा $1 = \sin 90^\circ = \sin(\theta + \alpha)$ अत: $\boxed{\theta + \alpha = 90^\circ}$

अत:

$$\sin\theta = \frac{a}{c} \qquad \cos\theta = \frac{b}{c} \qquad \tan\theta = \frac{a}{b}$$

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$\sec^2\theta + \operatorname{cosec}^2\theta = \frac{1}{\cos^2\theta} + \frac{1}{\sin^2\theta}$

$= \frac{\sin^2\theta + \cos^2\theta}{\cos^2\theta \cdot \sin^2\theta} = \frac{1}{\cos^2\theta \cdot \sin^2\theta}$

$\therefore$ $\boxed{\sec^2\theta + \operatorname{cosec}^2\theta = \sec^2\theta \cdot \operatorname{cosec}^2\theta}$

$\tan\theta + \cot\theta = \frac{\sin\theta}{\cos\theta} + \frac{\cos\theta}{\sin\theta}$

$= \frac{\sin^2\theta + \cos^2\theta}{\sin\theta \cos\theta} = \frac{1}{\sin\theta \cdot \cos\theta}$

$\therefore$ $\boxed{\tan\theta + \cot\theta = \sec\theta \cdot \operatorname{cosec}\theta}$

सर्वसमिका - (2) $\boxed{\sec^2\theta - \tan^2\theta = 1}$

$\sec^2\theta = 1 + \tan^2\theta$ & $\tan^2\theta = \sec^2\theta - 1$

$\downarrow$ $\downarrow$

$\sec\theta = \sqrt{1 + \tan^2\theta}$ $\quad$ $\tan\theta = \sqrt{\sec^2\theta - 1}$

$\sec^2\theta - \tan^2\theta = (\sec\theta - \tan\theta)(\sec\theta + \tan\theta)$

$\boxed{(\sec\theta - \tan\theta)(\sec\theta + \tan\theta) = 1}$

$(\sec\theta + \tan\theta) = \frac{1}{(\sec\theta - \tan\theta)}$ or, $(\sec\theta - \tan\theta) = \frac{1}{(\sec\theta + \tan\theta)}$

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जब $\sec\theta + \tan\theta = x$ व $\sec\theta - \tan\theta = \frac{1}{x}$ हो तो

$$\sec\theta = \left(x + \frac{1}{x}\right)\times\frac{1}{2} \quad \text{or} \quad \sec\theta = \left(\frac{x^2+1}{2x}\right)$$

व

$$\tan\theta = \left(x - \frac{1}{x}\right)\times\frac{1}{2} \quad \text{or} \quad \tan\theta = \left(\frac{x^2-1}{2x}\right)$$

Q:- $\sec\theta + \tan\theta = 3$ हो तो $\sec\theta$ व $\tan\theta$ क्या होगा ।

soln:- $\sec\theta = \left(3 + \frac{1}{3}\right)\times\frac{1}{2} = \frac{10}{6} = \frac{5}{3}$

व $\tan\theta = \left(3 - \frac{1}{3}\right)\times\frac{1}{2} = \frac{8}{6} = \frac{4}{3}$ ans

$\tan^2\theta - \sin^2\theta = \sin^2\theta\left(\frac{1}{\cos^2\theta} - 1\right)$

$$= \sin^2\theta\,(\sec^2\theta - 1)$$

$$\boxed{\tan^2\theta - \sin^2\theta = \sin^2\theta \cdot \tan^2\theta}$$

सर्वसमिका - (3) $\boxed{\operatorname{cosec}^2\theta - \cot^2\theta = 1}$

$\operatorname{cosec}^2\theta = 1 + \cot^2\theta$ व $\cot^2\theta = \operatorname{cosec}^2\theta - 1$

$\operatorname{cosec}\theta = \sqrt{1 + \cot^2\theta}$ $\quad$ $\cot\theta = \sqrt{\operatorname{cosec}^2\theta - 1}$

$(\operatorname{cosec}\theta - \cot\theta)(\operatorname{cosec}\theta + \cot\theta) = 1$

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$(\text{cosec}\theta - \cot\theta) = \dfrac{1}{(\text{cosec}\theta + \cot\theta)}$ & $(\text{cosec}\theta + \cot\theta) = \dfrac{1}{(\text{cosec}\theta - \cot\theta)}$

यदि $\text{cosec}\theta + \cot\theta = x$ तो $\text{cosec}\theta - \cot\theta = \dfrac{1}{x}$ होगा

$$\text{cosec}\theta = \left(x + \frac{1}{x}\right) \times \frac{1}{2} \quad \text{or} \quad \text{cosec}\theta = \left(\frac{x^2+1}{2x}\right)$$

$$\cot\theta = \left(x - \frac{1}{x}\right) \times \frac{1}{2} \quad \text{or} \quad \cot\theta = \left(\frac{x^2-1}{2x}\right)$$

$$\cot^2\theta - \cos^2\theta = \cos^2\theta \left(\frac{1}{\sin^2\theta} - 1\right)$$

$$= \cos^2\theta \left(\text{cosec}^2\theta - 1\right)$$

$$\boxed{\cot^2\theta - \cos^2\theta = \cos^2\theta . \cot^2\theta}$$

Some formulas :-

$$\sin(A \pm B) = \sin A \cos B \pm \cos A \sin B$$

$$\cos(A \pm B) = \cos A \cos B \mp \sin A \sin B$$

$$\tan(A \pm B) = \frac{\tan A \pm \tan B}{1 \mp \tan A . \tan B}$$

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$\Rightarrow$ Now $\sin 75^\circ = \sin(45^\circ + 30^\circ) = \sin 45^\circ \cos 30^\circ + \cos 45^\circ \sin 30^\circ$

$$= \frac{1}{\sqrt{2}} \times \frac{\sqrt{3}}{2} + \frac{1}{\sqrt{2}} \times \frac{1}{2}$$

$$\sin 75^\circ = \frac{\sqrt{3}+1}{2\sqrt{2}} \iff \cos 15^\circ$$

\# $\cos 75^\circ = \cos 45^\circ \cos 30^\circ - \sin 45^\circ \sin 30^\circ$

$$= \frac{\sqrt{3}-1}{2\sqrt{2}} \iff \sin 15^\circ$$

\# $\tan 75^\circ = \frac{\sqrt{3}+1}{\sqrt{3}-1} \times \frac{2\sqrt{2}}{2\sqrt{2}} \times \left(\frac{\sqrt{3}+1}{\sqrt{3}+1}\right) = \frac{4+2\sqrt{3}}{2}$

$$\tan 75^\circ = 2+\sqrt{3} \iff \cot 15^\circ$$

\# $\cot 75^\circ = \frac{1}{\tan 75^\circ} = 2-\sqrt{3} \iff \tan 15^\circ$

$\Rightarrow$ Now $\sin 2\theta = \sin(\theta+\theta) = \sin\theta\cos\theta + \sin\theta\cos\theta$

$$= 2\sin\theta\cos\theta \quad \text{——— (1)}$$

$$= (\sin\theta + \cos\theta)^2 - 1 \quad \text{——— (2)}$$

$$= 1 - (\sin\theta - \cos\theta)^2 \quad \text{——— (3)}$$

$$= \frac{1}{2}\left[(\sin\theta+\cos\theta)^2 - (\sin\theta-\cos\theta)^2\right] \quad \text{— (4)}$$

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from eq. (1) →

$$\sin 2\theta = 2\sin\theta\cos\theta \times \frac{\cos^2\theta}{\cos^2\theta}$$

$$= \frac{2\tan\theta}{\sec^2\theta}$$

$$\sin 2\theta = \frac{2\tan\theta}{1+\tan^2\theta} \quad \text{——— (5)}$$

इसी प्रकार →

$$\Rightarrow \cos 2\theta = \cos(\theta+\theta) = \cos\theta\cos\theta - \sin\theta\sin\theta$$

$$\cos 2\theta = \cos^2\theta - \sin^2\theta \quad \text{——— (1)}$$

$$= 2\cos^2\theta - 1 \quad \text{——— (2)}$$

$$= 1 - 2\sin^2\theta \quad \text{——— (3)}$$

$$= \cos^4\theta - \sin^4\theta \quad \text{——— (4)}$$

$$\cos 2\theta = \frac{1-\tan^2\theta}{1+\tan^2\theta} \quad \text{——— (5)}$$ [same process as sin2θ]

$$\# \quad \tan 2\theta = \tan(\theta+\theta) = \frac{\tan\theta+\tan\theta}{1-\tan\theta\cdot\tan\theta}$$

$$\tan 2\theta = \frac{2\tan\theta}{1-\tan^2\theta}$$

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$m\sin^2\theta + n\cos^2\theta$ ⟶ न्युनतम मान ⇒ m तथा n में से जो छोटा है, उसका संख्यात्मक मान

⟶ अधिकतम मान ⇒ m तथा n में से जो बड़ा है, उसका संख्यात्मक मान

Ex:- $9\sin^2\theta + 4\cos^2\theta$ (by using $\sin^2\theta + \cos^2\theta = 1$)

$\Rightarrow 5\sin^2\theta + 4$

→ न्युनतम मान = 4 जब $\sin^2\theta = 0$

→ अधिकतम मान = 9 " $\sin^2\theta = 1$ हो।

$m\sin\theta \pm n\cos\theta$ की →

Maxi. Value → $+\left(\sqrt{m^2+n^2}\right)$

Mini. Value → $-\left(\sqrt{m^2+n^2}\right)$

Ex:- $3\sin\theta + 4\cos\theta$ के लिये →

maxi. value → $\sqrt{3^2+4^2} = 5$

and Mini. Value → -5 ans

$m\sin^2\theta + n\operatorname{cosec}^2\theta$ के लिये →

न्युनतम मान = $2\sqrt{mn}$ or $\sqrt{4mn}$

$m\cos^2\theta + n\sec^2\theta$
$m\tan^2\theta + n\cot^2\theta$ → mini. value ⇒ $2\sqrt{mn}$

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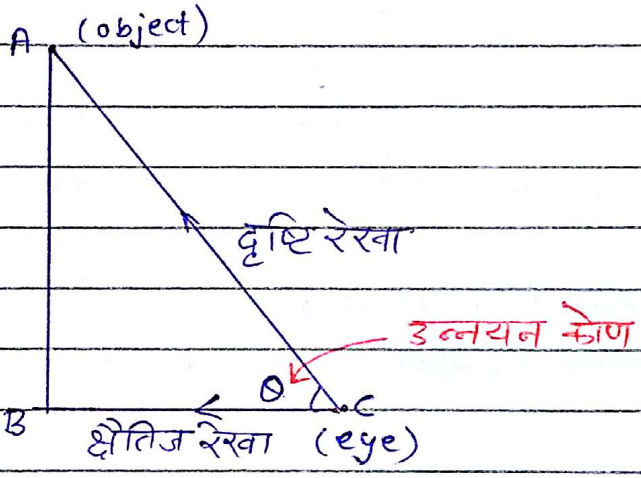
Ex:- $4\sin^2\theta + 9\operatorname{cosec}^2\theta$ का न्युनतम मान $= 2\sqrt{4\times9} = 12$ ans

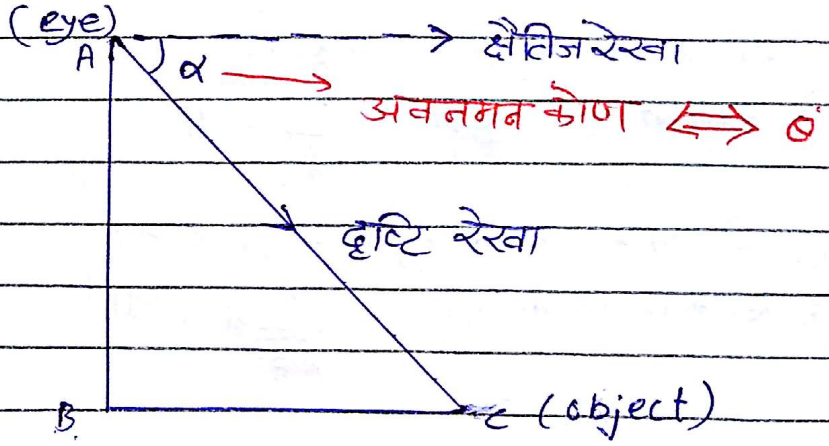
$m\sec^2\theta + n\operatorname{cosec}^2\theta$ के लिये

न्युनतम मान $= (\sqrt{m} + \sqrt{n})^2$

Ex:- $4\sec^2\theta + 9\operatorname{cosec}^2\theta$ का न्युनतम मान $= (\sqrt{4} + \sqrt{9})^2 = 25$

Height & Distance :- (उन्नयन व अवनमन कोण)





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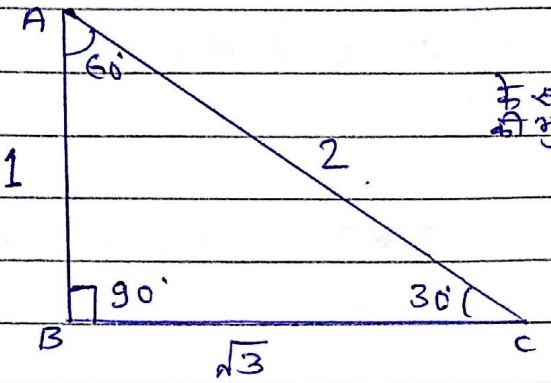
For Fast Calculations → Angle Ratios →

① 30°, 60°, 90° Combination :-



30° : 60° : 90°
के सामने की भुजा ↓ ↓ ↓
1 : √3 : 2

Hints :-

① यदि 30° के सामने की भुजा = म हो तो
60° के सामने की भुजा = √3 म होगी ।

② 60° के सामने की भुजा म हो तो
30° के सामने की भुजा = $\frac{म}{\sqrt{3}}$ होगी ।

③ 30° के सामने की भुजा = म हो तो
90° के सामने की भुजा = 2म होगी ।

④ 90° के सामने की भुजा = म हो तो
30° के सामने की भुजा = $\frac{म}{2}$ होगी ।

⑤ यदि 60° के सामने वाली भुजा = म हो तो
90° के सामने वाली भुजा = $\frac{2}{\sqrt{3}}$ म होगी।

⑥ यदि 90° के सामने वाली भुजा = म हो तो
60° के सामने वाली भुजा = $\frac{\sqrt{3}}{2}$ म होगी।

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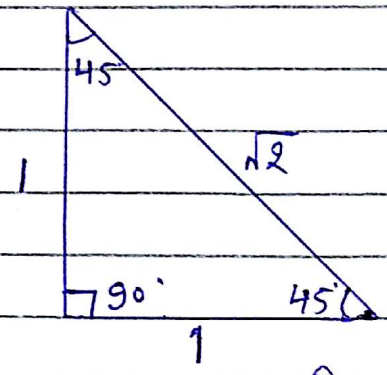
② 45°, 45°, 90° Combination हो तो →



45° : 45 : 90°
के सामने वाली भुजा ↓ ↓ ↓
1 : 1 : √2

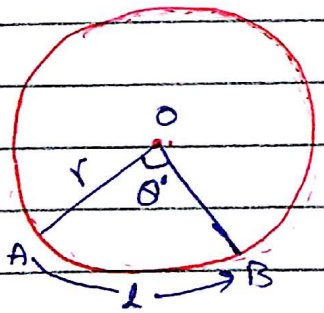
Hint: ① यदि 45° के सामने वाली भुजा = म हो तो
90° के सामने वाली भुजा = √2 म होगी।

② यदि 90° के सामने वाली भुजा = म दे रखी हो तो
45° के सामने वाली भुजा = $\frac{म}{\sqrt{2}}$ होगी।

Miscellaneous Results :-

⇒ जब $\sin\theta + \operatorname{cosec}\theta = 2$
$\cos\theta + \sec\theta = 2$ दे रखा हो तो
$\tan\theta + \cot\theta = 2$

$\sin^{म}\theta + \operatorname{cosec}^{य}\theta = 2$
$\cos^{न}\theta + \sec^{य}\theta = 2$ होगा
$\tan^{म}\theta + \cot^{य}\theta = 2$
[यहाँ म न य Question में दिया होगा]

⇒ 

चाप की लम्बाई $l = \frac{\theta^\circ}{360^\circ} \times 2\pi r$ [r → त्रिज्या]

⇒ π रेडियन = 180° डिग्री

⇒ 1 रेडियन = 57°16'22"

-@ias

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